



40th ACTUARIAL RESEARCH CONFERENCE

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IAA Immediate Past President

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AN ACTUARY IS ...

- A person highly trained in mathematics and statistics who calculates rates and dividends, and provides other statistical information for an insurance company
- A social mathematician who uses mathematical skill to define, analyze and solve complex business and social problems involving insurance and employee benefits programs
- A person who calculates the probability of future events in order to measure risk for a company or individual.
- A professional who analyze the financial impact of risk, particularly looking ahead far into the future. An actuary uses mathematical, economic, financial and statistical skills to study uncertain future events, especially those of concern to insurance companies; employee benefits, such as medical insurance and pensions plans; and social welfare programs such as social security and Medicare



RESEARCH IS ...

- **An active, diligent and systematic process of inquiry in order to discover, interpret or revise facts, events, behaviors, or theories, or to make practical applications with the help of such facts, laws or theories. The term “research” is also used to describe the collection of information about a particular subject.**
- **A systematic investigation designed to develop or contribute to the generalization of knowledge. A retrospective study conducted by reviewing records from the past or by obtaining information about past events elicited through interviews or surveys.**
- **A careful hunting for facts or truth about a subject; inquiry; investigation**

DEMOGRAPHIC INDICATORS

Demographic transition constitutes a process that entails going from:

An initial low population growth regime, with high birth and mortality rates, characteristic in traditional societies



to another one, also having a low population growth



But now, due to low and controlled levels of birth and mortality, characteristic in modern societies

DEMOGRAPHIC INDICATORS

1990-2050

Indicator	1930	1950	1970	1990	2005	2025	2050
Mid-year Population	16 552 722	25 791 017	34 923 129	85 376 272	106451679	124329636	129592522
Men	8 119 004	12 696 935	17 415 320	42 548 478	52929290	61471157	63605036
Women	8 433 718	13 094 082	17 507 809	42 827 794	53522389	62858479	65987486
Births	819 814	1 174 947	2 132 630	2 481 803	1959018	1754594	1421631
Deaths	441 717	418 430	485 656	445 047	474041	713251	1343333
Natural growth				2 036 756	1484977	1041343	78298
Social growth				-336769	-399729	-378122	-303172
Total growth				1 699 987	1085248	663221	-224874
Gross birth rate*	49.4	44.2	42.7	29.07	18.4	14.1	11.0
Gross death rate*	26.4	15.7	9.6	5.21	4.5	5.7	10.4
Natural growth rate**	1.83	2.81	3.4	2.39	1.39	0.84	0.06
Social growth rate**				-0.39	-0.38	-0.30	-0.23
Total growth rate**	1.99	2.76	3.1	1.99	1.02	0.53	-0.17
Global fertility rate			5.7	3.44	2.11	1.86	1.85
Total life expectancy	36.1	50.0	61.9	71.20	75.4	79.2	81.3
Life expectancy. Men	35.4	48.7	60.0	68.33	73.0	76.8	79.0
Life expectancy. Women	37.9	52.2	63.7	74.07	77.9	81.6	83.6
Infant mortality rate*	177.1	128.3	75.4	36.2	18.8	9.2	5.5

*Per thousand

**Per hundred

Source: CONAPO, 2005

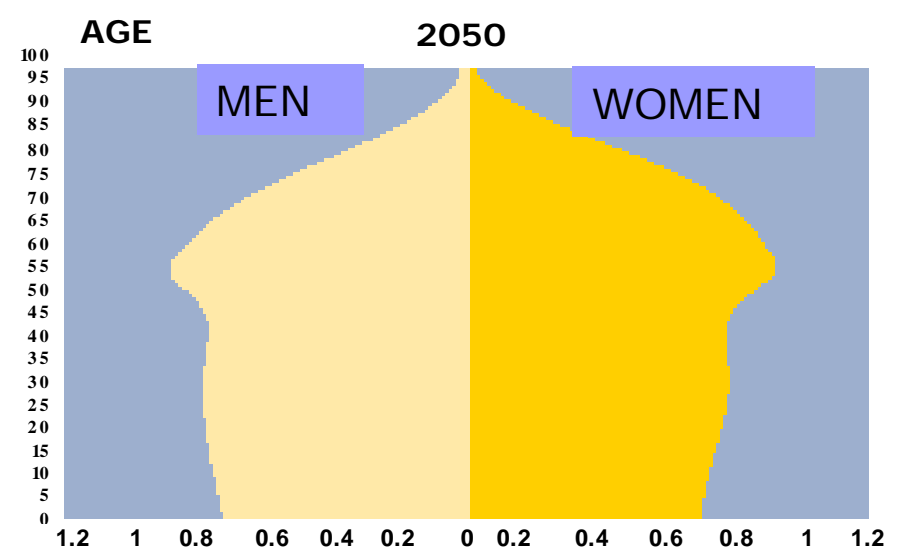
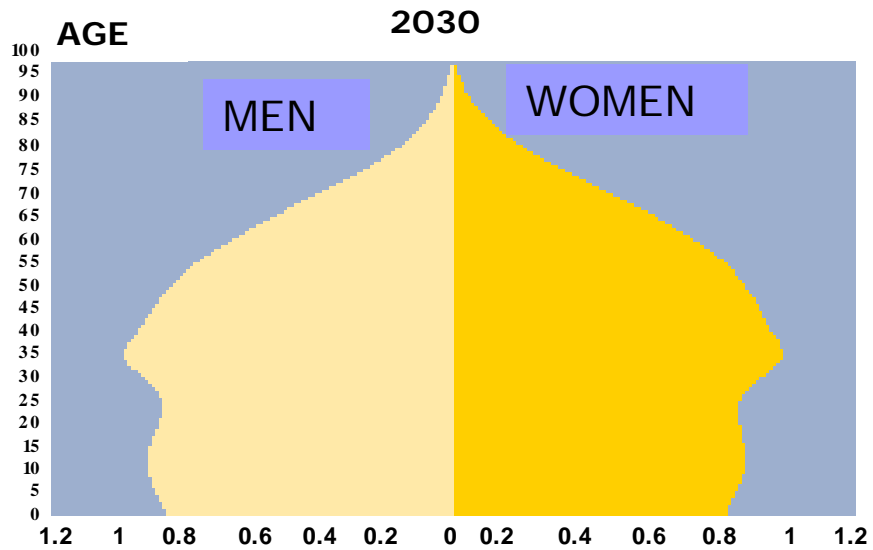
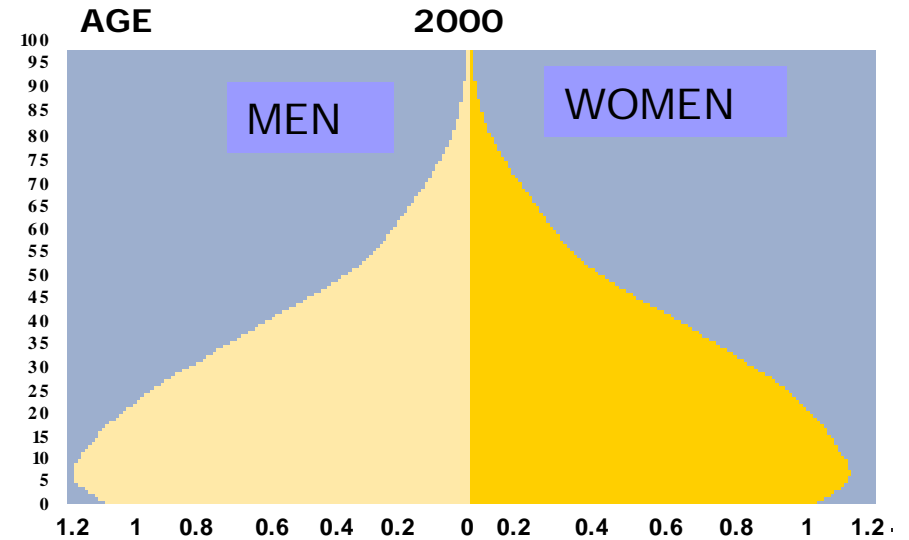
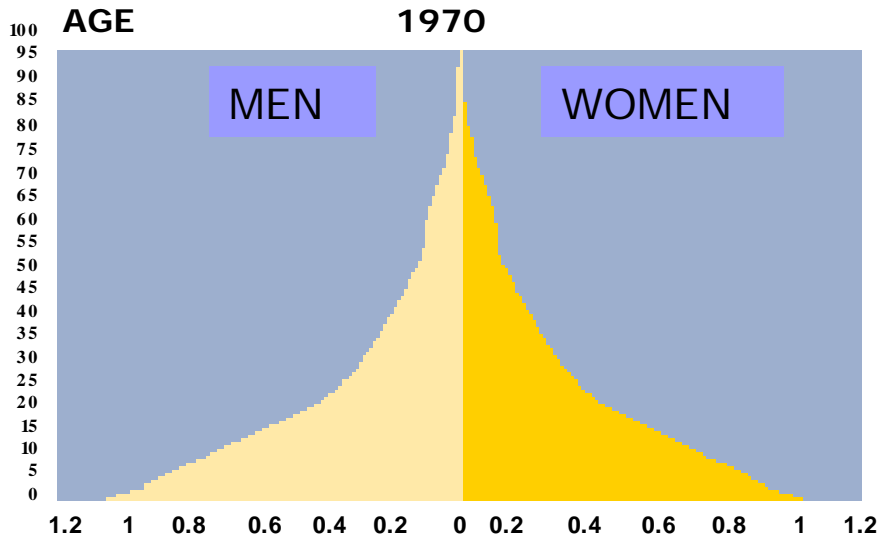


POPULATION IN MEXICO

106,451,979

Source: INEGI, 2004

POPULATION PYRAMIDS IN MEXICO, 1970 - 2050



Source: CONAPO, 2005



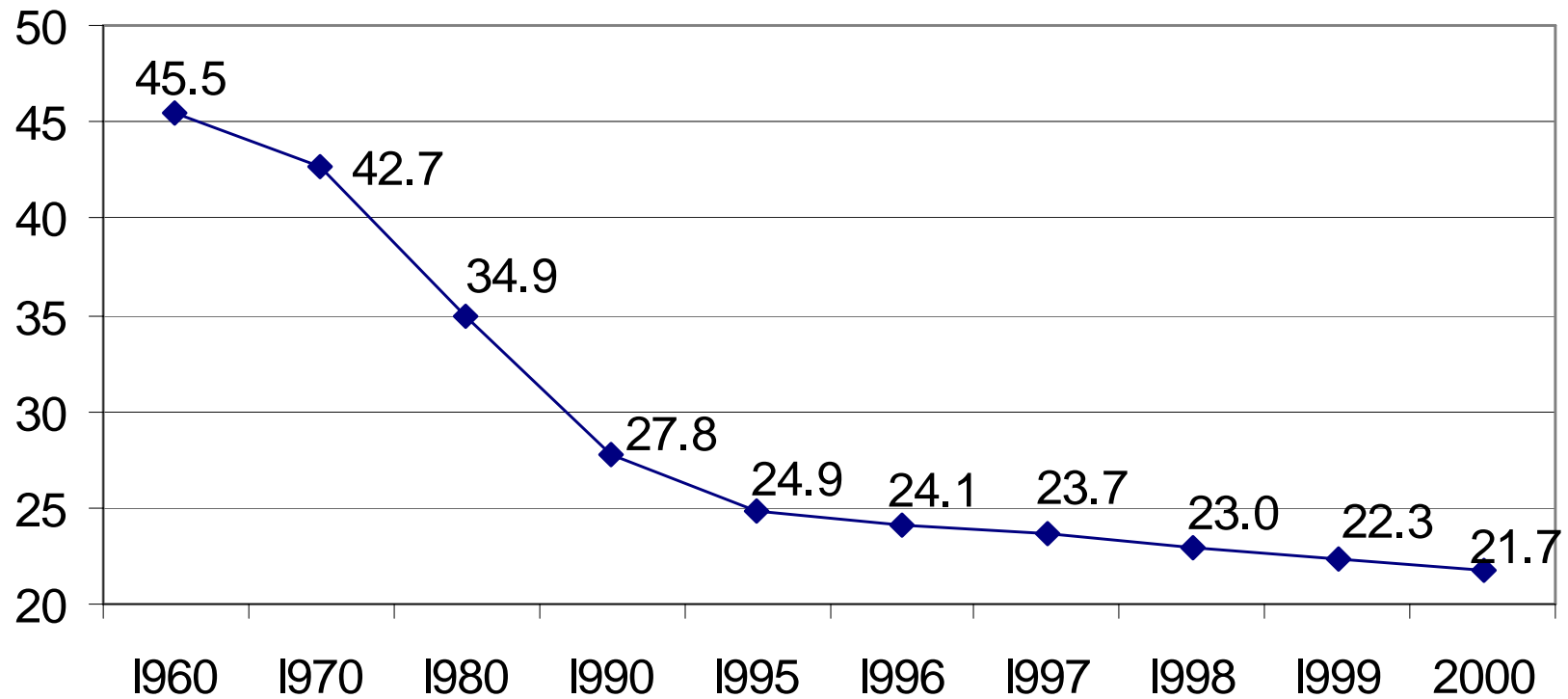
POPULATION INCREASE BY AGE

TOTAL POPULATION EVOLUTION PER AGE, 1950 - 2050

AGE	1950	1970	1990	2000	2010*	2030*	2050*
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00
0 – 14	41.76	46.21	38.30	33.00	28.44	22.09	19.30
15 – 59	52.61	48.17	54.90	59.90	62.87	62.15	56.36
60 y más	5.50	5.60	6.14	7.10	8.69	15.76	24.34

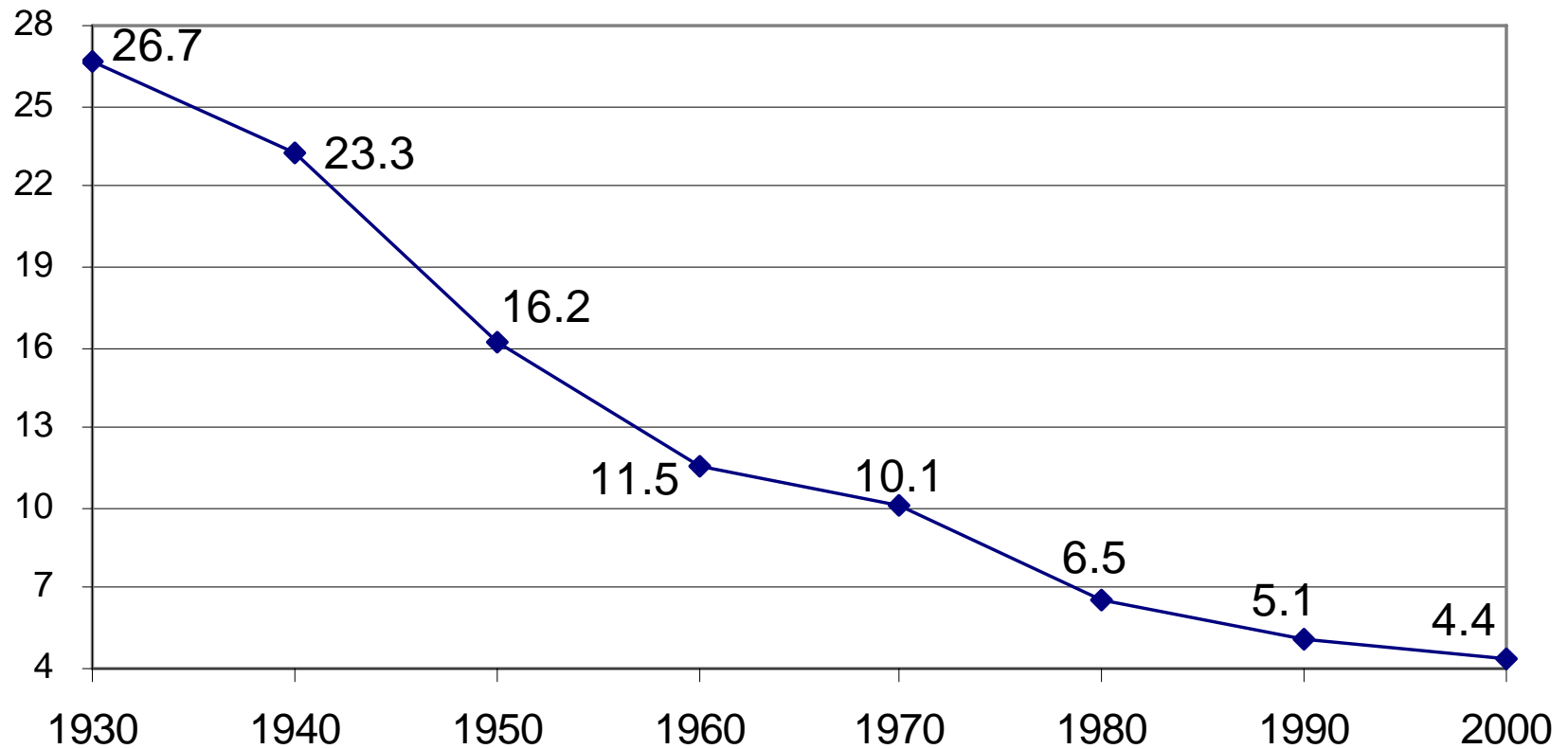
Source: CONAPO, 2005

GROSS BIRTH RATE 1960 - 2000



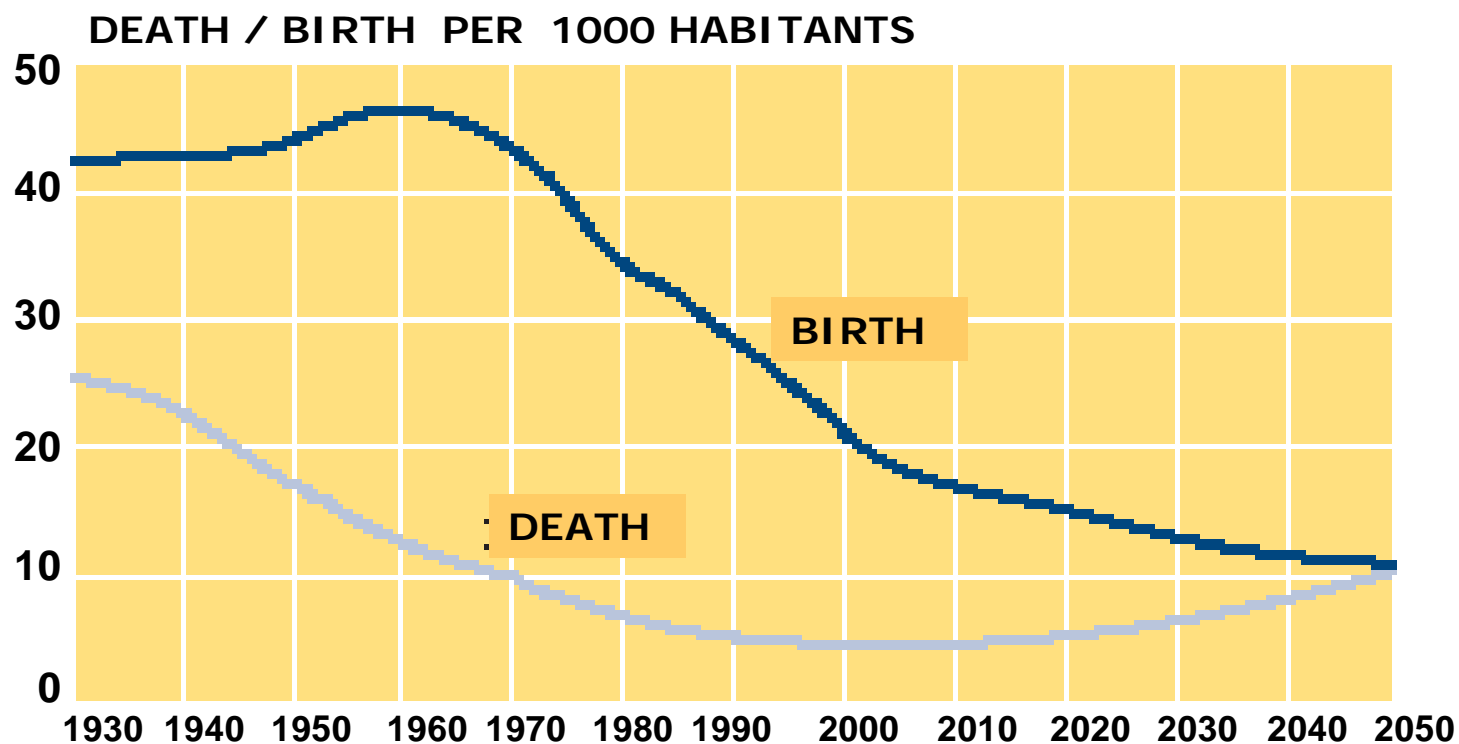
Source: INEGI, 2004

GROSS DEATH RATE 1930 - 2000



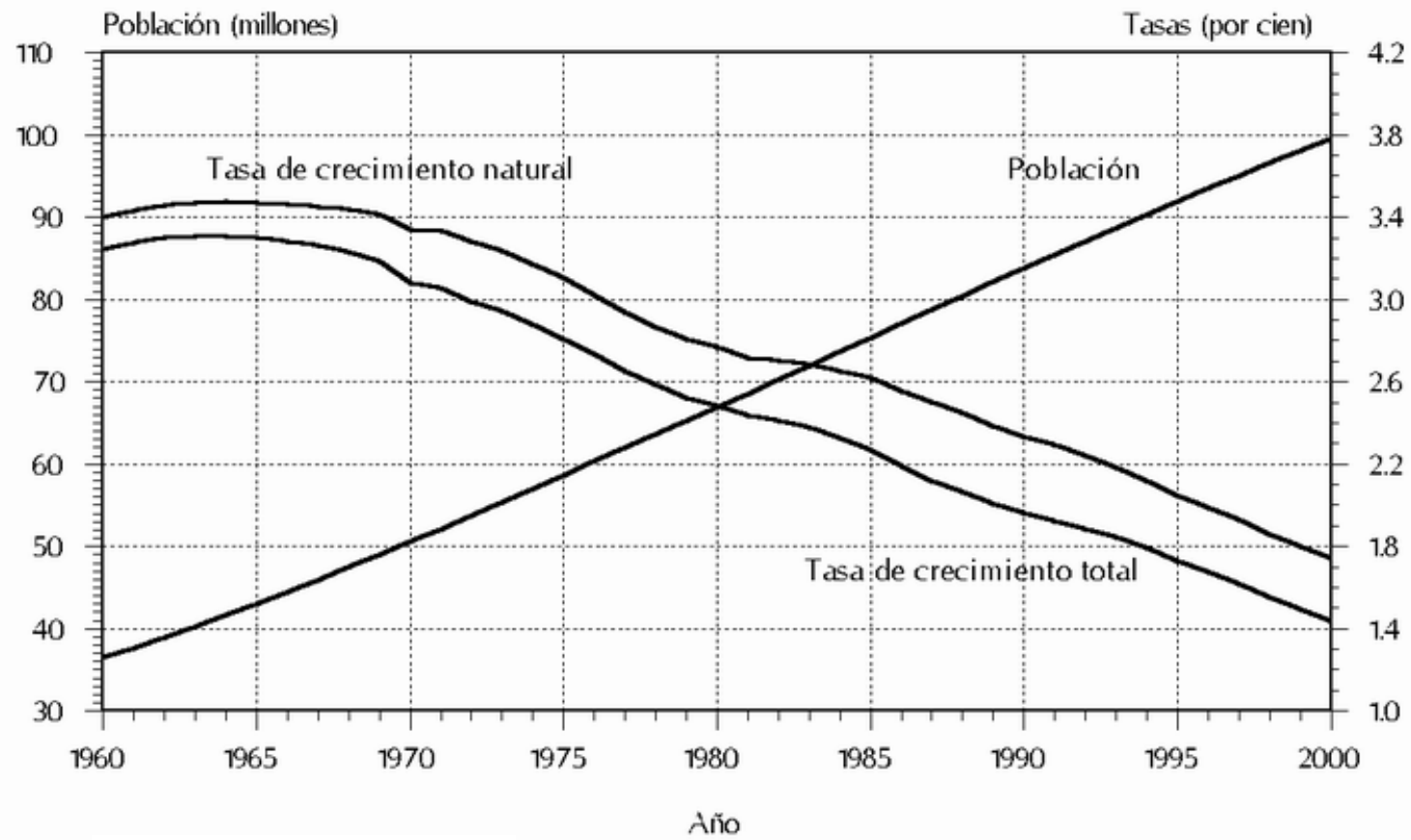
Source: INEGI, 2004

MEXICO'S DEMOGRAPHIC TRANSITION 1930 – 2050



Source: CONAPO, 2004

GROWTH RATES 1960 - 2000



Source: CONAPO, 2004

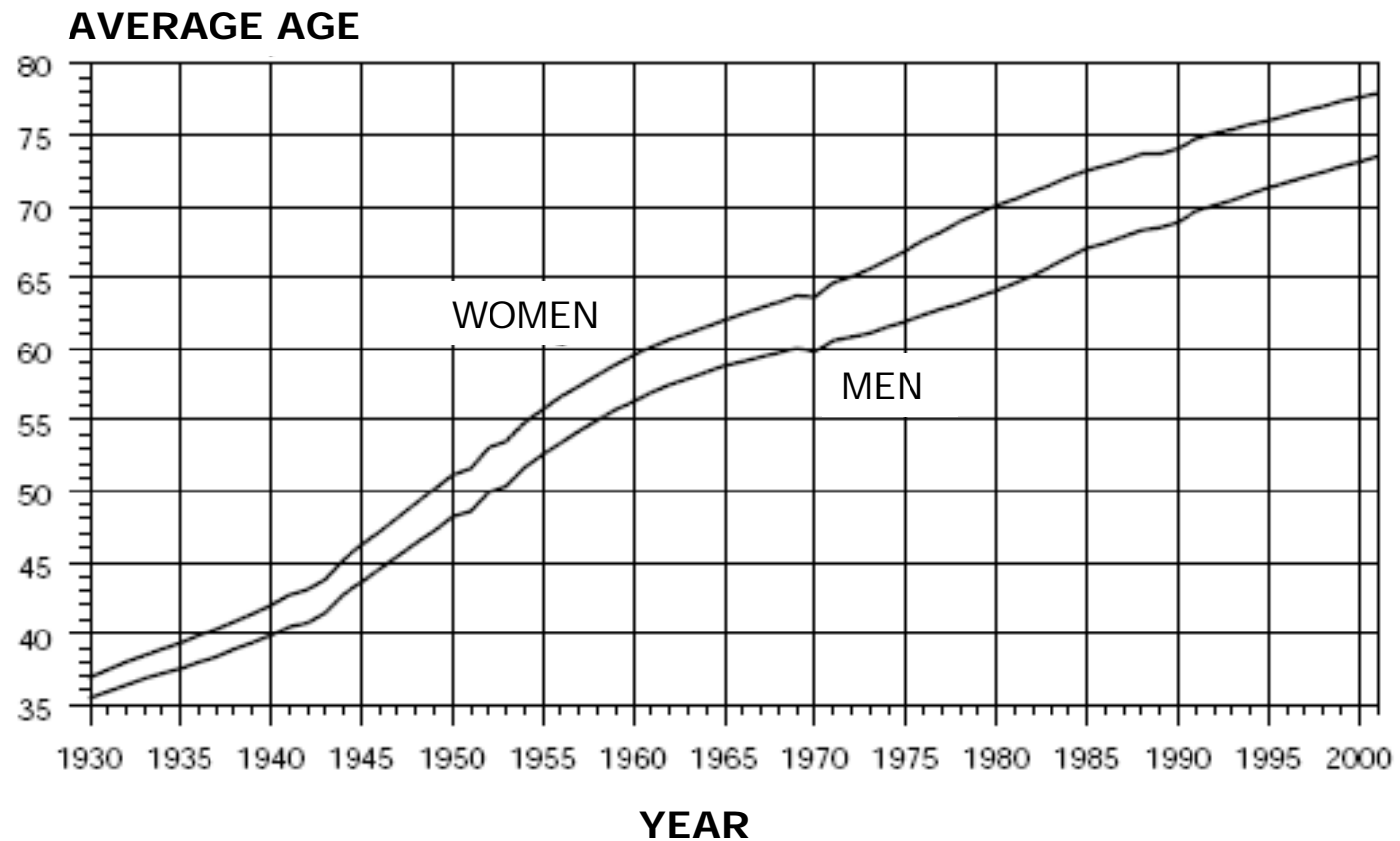


TOTAL SOCIAL GROWTH

- **or Total Net Immigration.** *This is the algebraic sum of the net interstate immigration and the international net immigration.*

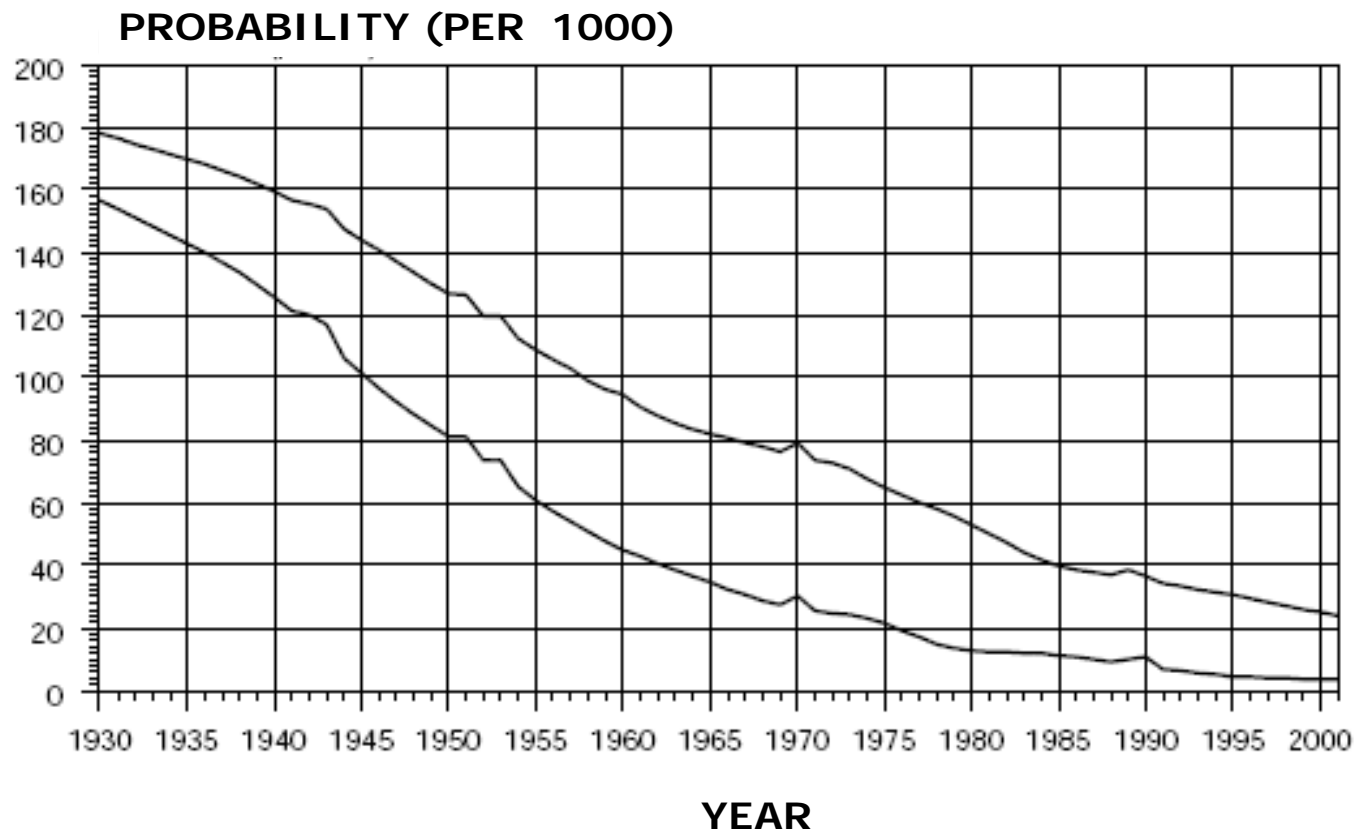
Years	1960 – 1970	1970 – 1980	1980 – 1990	1990 – 2000	2000- 2010
Social growth	-0.15	0.13	-0.94	-0.39	-0.30

LIFE EXPECTANCY AT BIRTH BY GENDER, 1930-2001



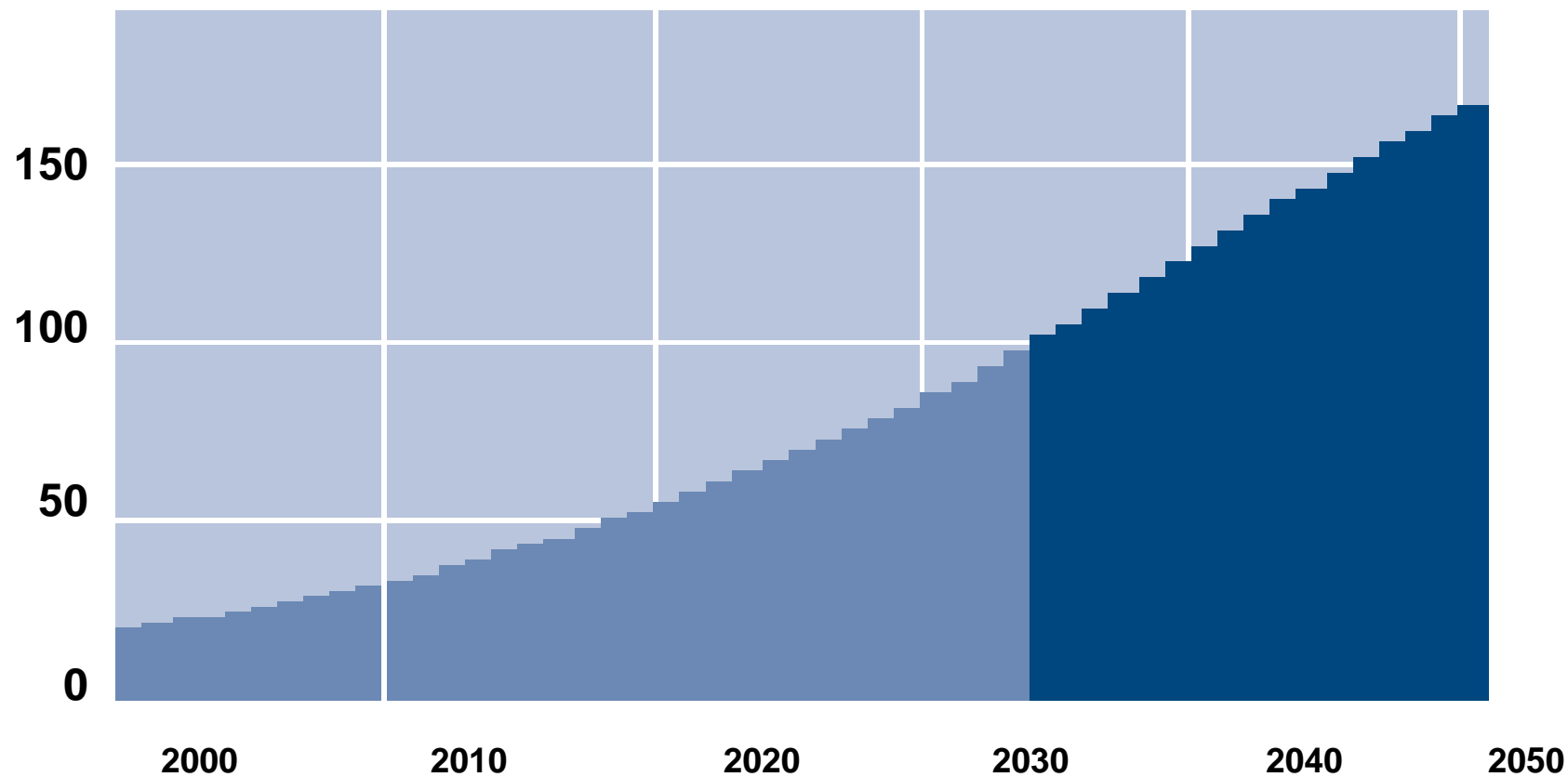
Source: CONAPO, 2004

INFANT MORTALITY RATE AND PROBABILITY OF DEATH BETWEEN AGES 1 AND 4, 1930-2000



Source: CONAPO, 2004

AGING INDEX OF MEXICAN POPULATION, 2000-2050



Adults (+60) per 100 children

Source: CONAPO, 2004



DEMOGRAPHIC INDICATORS

- The largest population growth in the country occurs between 1960 and 1970 (with an approximate growth rate of 3.5%).
- A birth rate decrease may be appreciated as of 1970,
- which occurs after the mortality rate decrease initiated almost four decades before. By 1950, the general mortality rate was 13.15 deaths per thousand inhabitants. By the end of the 70's this rate had been cut in half (6.47 deaths per thousand inhabitants).
- As of 1980, the gap between both rates starts decreasing (the growth rate for 2000 was 1.27%), so much so that a slight increase in the general mortality rate is exhibited in 2010,
- while the gross birth rate continues decreasing due to the changes in age structure of the country's population,
- up to the year 2050, when the mortality rate exceeds the birth rate. By this decade we shall have a large percentage of people over 60 and a small number of individuals in breeding age, which accounts for these levels in the gross birth rate.



DEMOGRAPHIC TRANSITION

- Throughout 2005, the country's population will increase by 1.1 million people.
- In 2005, Mexico expects to have 106.5 million inhabitants.

During said year, it is estimated that:

- more than 2 million births will take place
- 474 thousand people will die
- The international immigration net balance will be negative by 400 thousand individuals.
- the country's population is growing at an annual rate of 1.02%.



DEMOGRAPHIC TRANSITION

- The 1.4% natural growth rate, resulting from the balance between births and deaths,
- is reduced by the -0.38% social growth rate, derived from the immigration phenomenon.
- Therefore, the Mexican population will attain a growth rate of less than 1.1% in 2005 and Mexico will be headed towards the last stage of demographic transition.
- Demographic transition means moving from a regime characterized by high mortality and fertility levels to one that has low and controlled levels.
- In this process, the Mexican population entered the new millennium with a natural growth rate similar to that observed 70 years ago, although its numbers are six times greater.



MORTALITY

- Mortality is the aspect that, paradoxically, better describes the health situation of the population.
- In our country, the decrease in mortality is steadily observed ever since sometime before 1940;
- However, this decrease has not occurred evenly throughout the country. Rural areas and, in particular, ethnic groups have been the least favored by the observed dynamics.



IMMIGRATION

- Between 1980 and 2000, the Mexican immigration to the US registered historical figures, which also contributed significantly to the decrease in growth rate of Mexico's population.
- At present, 12 million Mexicans live in the US.



LIFE EXPECTANCY INCREASE

- The average life expectancy of Mexicans is rapidly getting closer to that of developed countries.
- In the past seven decades, the life expectancy of the Mexican population increased by almost 40 years.
- The increase in life expectancy is largely due to the decrease in mortality during the first years of life.
- The greatest improvements concerning life expectancy are derived from the abatement of avoidable causes.



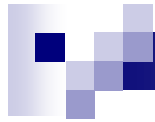
INFANT MORTALITY

- The decrease in infant mortality has occurred quite rapidly, compared to the historic experience of developed countries. In 1930, 178 out of every thousand newborns died before turning 1; in 2001, this ratio was of only 24 per thousand.
- There still are major regional and socio-economic disparities regarding infant mortality.
- There is a close relationship between the mother's level of education, and the housing conditions, on the one hand, and infant survival, on the other.
- The greatest improvements concerning life expectancy are derived from the abatement of avoidable causes.



AGING

- Aging is an unprecedented phenomenon that, in the past few years, has become more evident in the developed nations as well as in the developing countries such as Mexico.
- Demographic studies and research are essential, since they allow us to see the magnitude of social aging and its socio-cultural, epidemiologic and economic implications, so as to establish specific objectives for the various groups.
- The United Nations defined demographic aging as an increase in the elderly population and a decrease in the ratio of children and young people. According to these criteria, a population is deemed aged when more than 7% of its individuals are over 65 and more than 10% of them are 60 or older.
- The percentage of individuals around the world who are 65 or older increased from 9.2% in 1990 to 10% in 200. Forecasts predict 14% by the 2025.



AGING

- The aging process in Mexico during the past four decades can be attributed to the social and economic development which began during the 1930's.
- The effect of the two-fold decrease in mortality and fertility of Mexicans is demographic aging.
- As regards percentage participation, the decrease in fertility is the main reason; the decrease in mortality constitutes the first variable to favor life expectancy. In relative terms, the trend is for the elderly population to increase vis-à-vis the country's total: from 5.5% in 1950 to 7% in 2000.
- 80% of the elderly population does not have social security.